

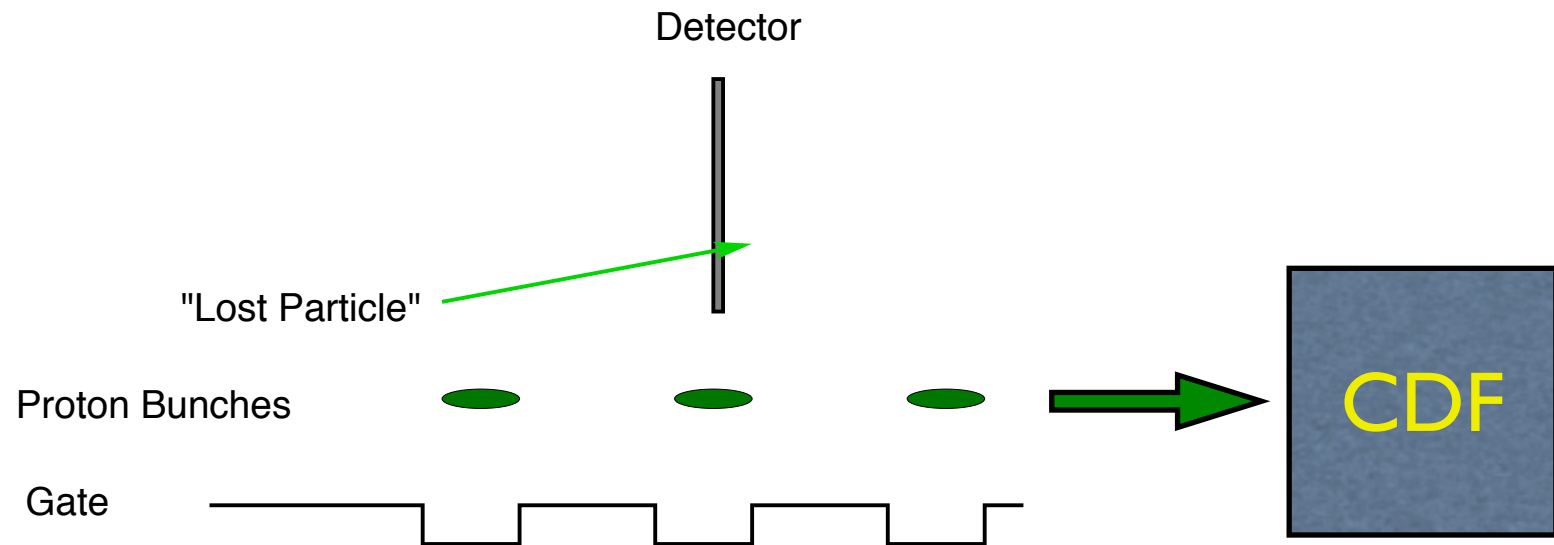
# Beam Halo and Abort Gap Monitoring

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(1/13/04)

# Calculating Losses

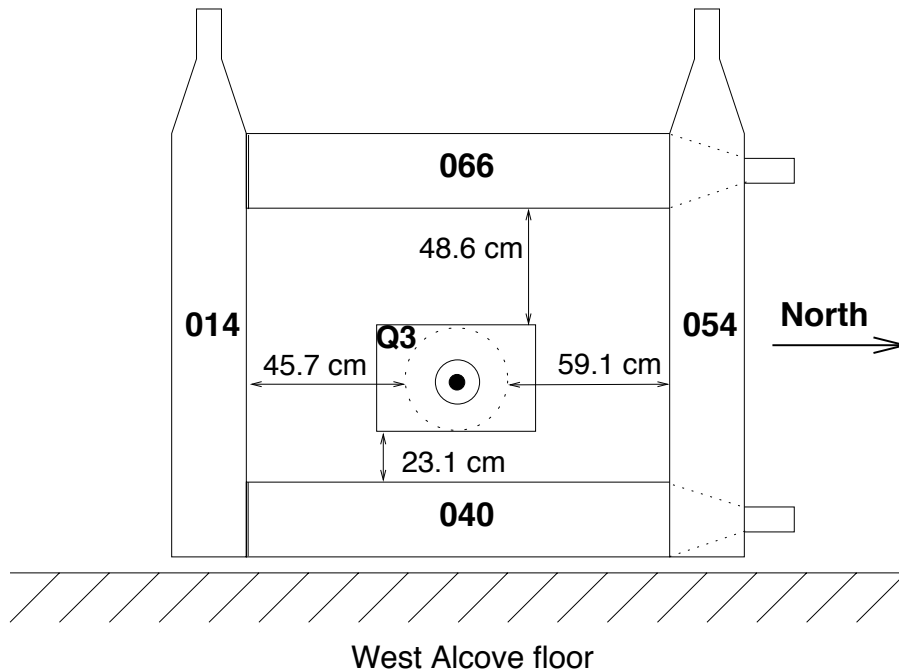
Beam Losses all calculated in the same fashion

- Detector signal in coincidence with beam passing the detector plane.
- ACNET variables differ by detector/gating method.

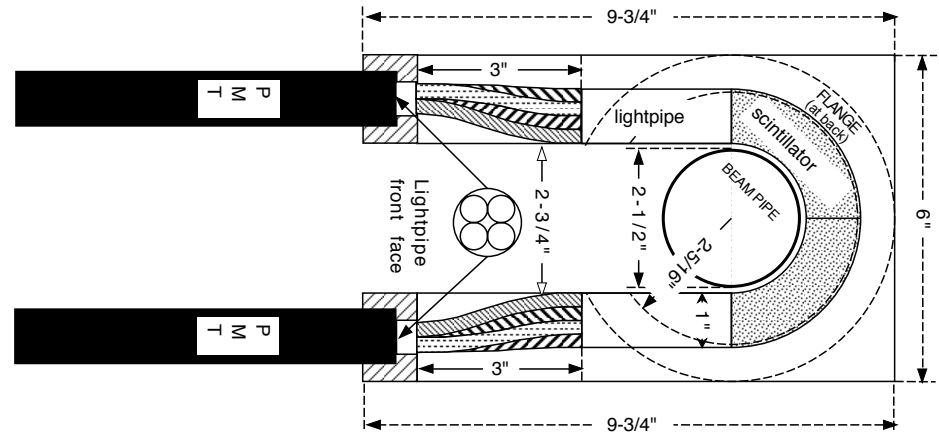


# Detectors

## Halo Counters



## Beam Shower Counters

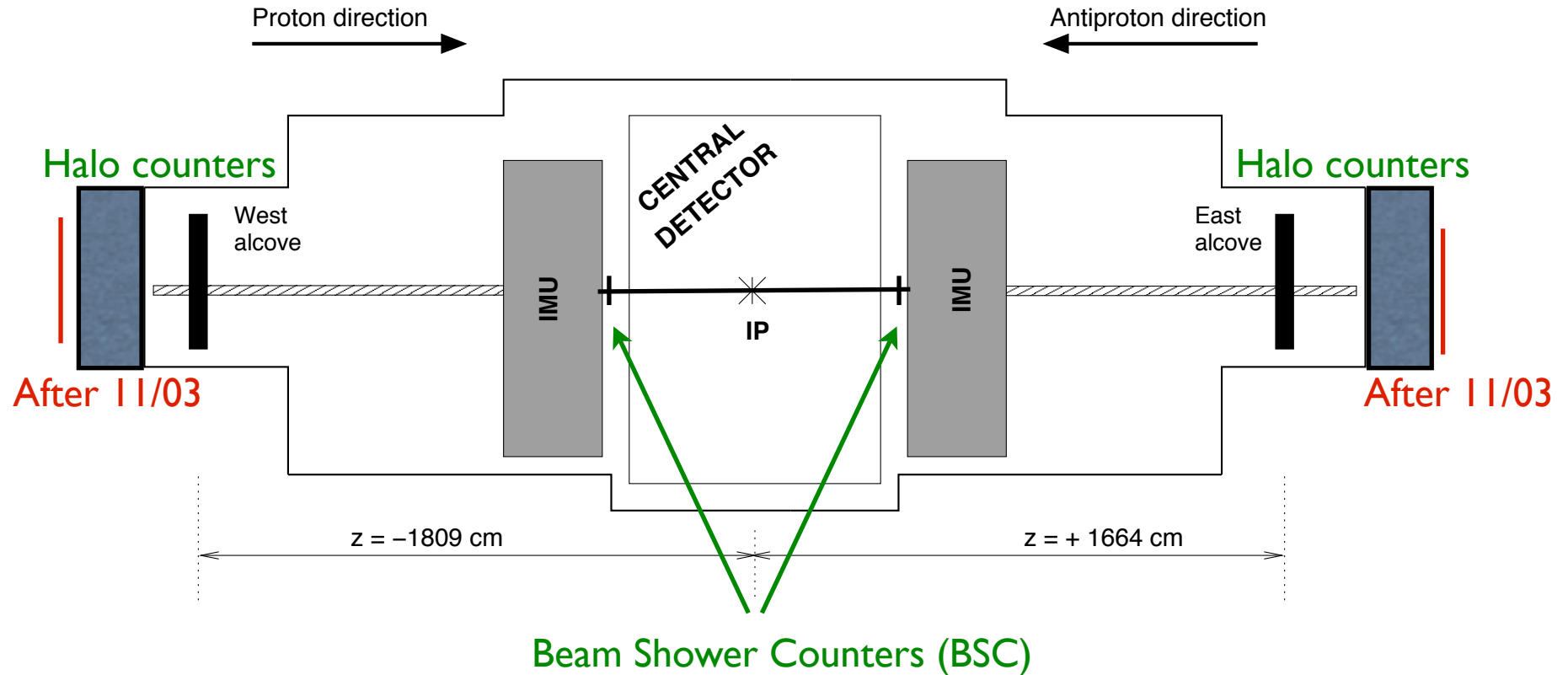


## ACNET variables:

**B0PHSM:** beam halo  
**B0PBSM:** abort gap losses  
**B0PAGC:** 2/4 coincidence abort gap losses

**B0PLOS:** proton losses (digital)  
**LOSTP:** proton losses (analog)  
**B0MSC3:** abort gap losses (E\*V coincidence)

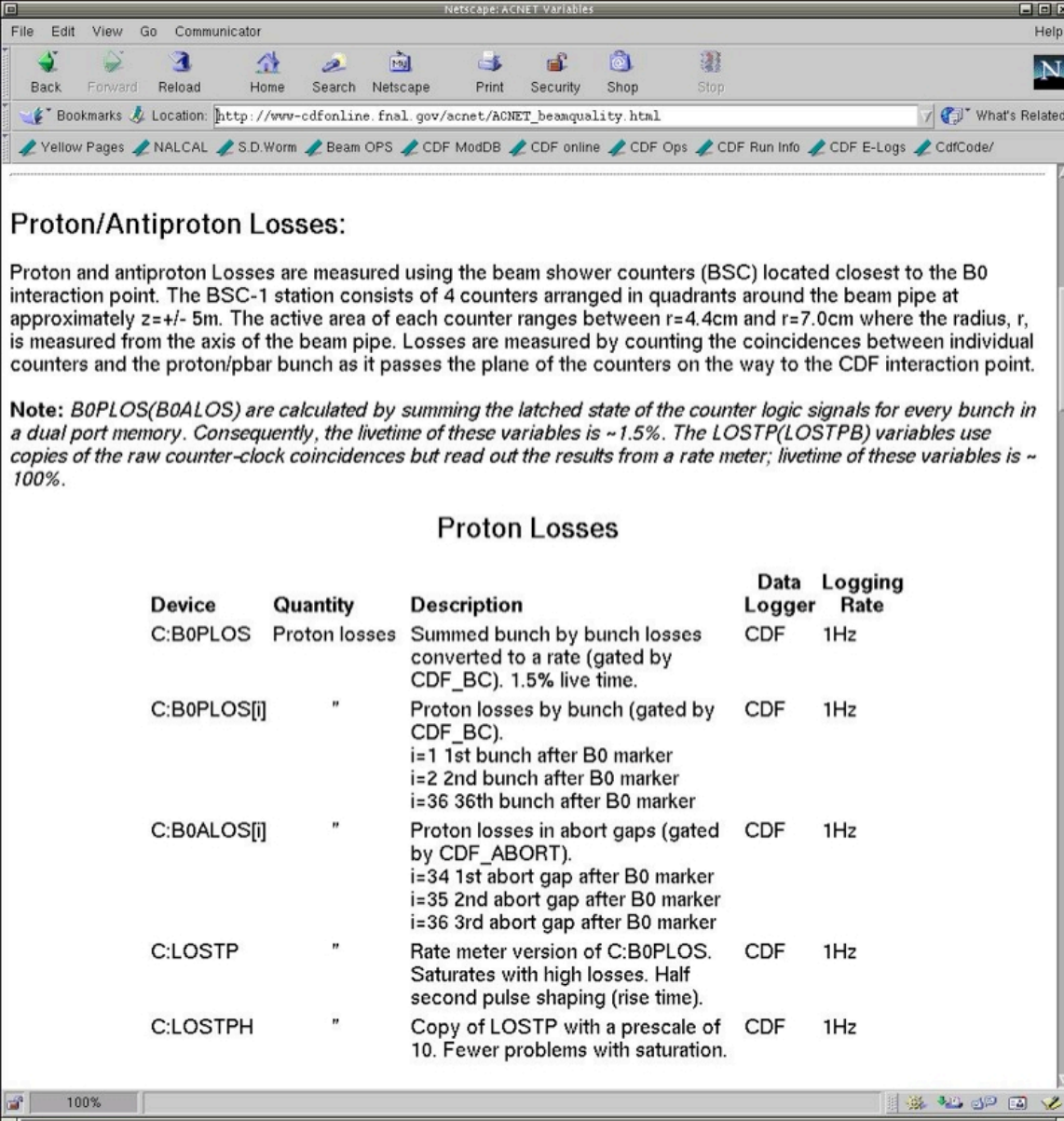
# Beam Monitors



BSC counters: monitor beam losses and abort gap

Halo counters: monitor beam halo and abort gap

# Documentation



**Proton/Antiproton Losses:**

Proton and antiproton Losses are measured using the beam shower counters (BSC) located closest to the B0 interaction point. The BSC-1 station consists of 4 counters arranged in quadrants around the beam pipe at approximately  $z = \pm 5$  m. The active area of each counter ranges between  $r = 4.4$  cm and  $r = 7.0$  cm where the radius,  $r$ , is measured from the axis of the beam pipe. Losses are measured by counting the coincidences between individual counters and the proton/pbar bunch as it passes the plane of the counters on the way to the CDF interaction point.

**Note:** B0PLOS(B0ALOS) are calculated by summing the latched state of the counter logic signals for every bunch in a dual port memory. Consequently, the livetime of these variables is  $\sim 1.5\%$ . The LOSTP(LOSTPB) variables use copies of the raw counter-clock coincidences but read out the results from a rate meter; livetime of these variables is  $\sim 100\%$ .

**Proton Losses**

Device	Quantity	Description	Data Logger	Logging Rate
C:B0PLOS	Proton losses	Summed bunch by bunch losses converted to a rate (gated by CDF_BC). 1.5% live time.	CDF	1Hz
C:B0PLOS[i]	"	Proton losses by bunch (gated by CDF_BC). i=1 1st bunch after B0 marker i=2 2nd bunch after B0 marker i=36 36th bunch after B0 marker	CDF	1Hz
C:B0ALOS[i]	"	Proton losses in abort gaps (gated by CDF_ABORT). i=34 1st abort gap after B0 marker i=35 2nd abort gap after B0 marker i=36 3rd abort gap after B0 marker	CDF	1Hz
C:LOSTP	"	Rate meter version of C:B0PLOS. Saturates with high losses. Half second pulse shaping (rise time).	CDF	1Hz
C:LOSTPH	"	Copy of LOSTP with a prescale of 10. Fewer problems with saturation.	CDF	1Hz

[http://www-cdfonline.fnal.gov/acnet/ACNET\\_beamquality.html](http://www-cdfonline.fnal.gov/acnet/ACNET_beamquality.html)

# Beam Halo Counters

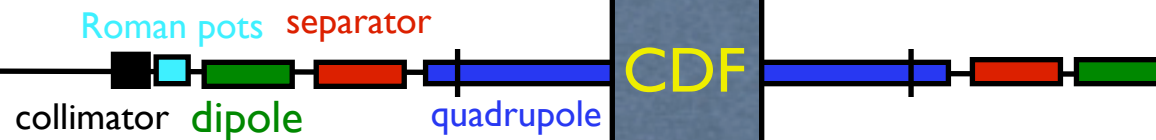


Protons

CDF

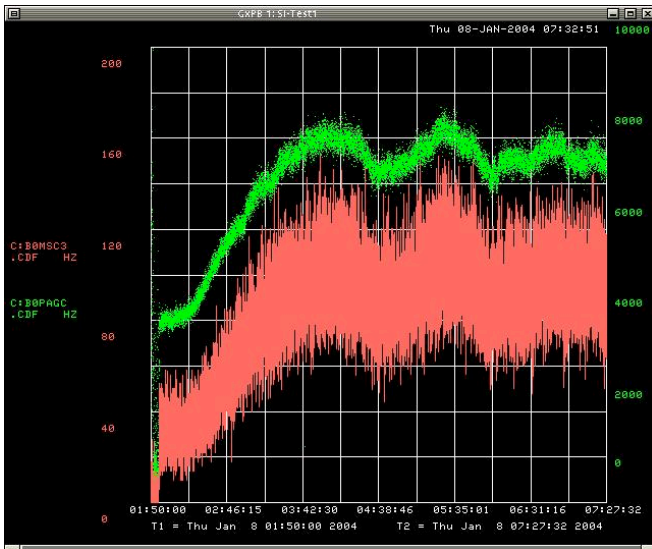


Antiprotons





# Re-calibrating abort gap rates



B0PAGC

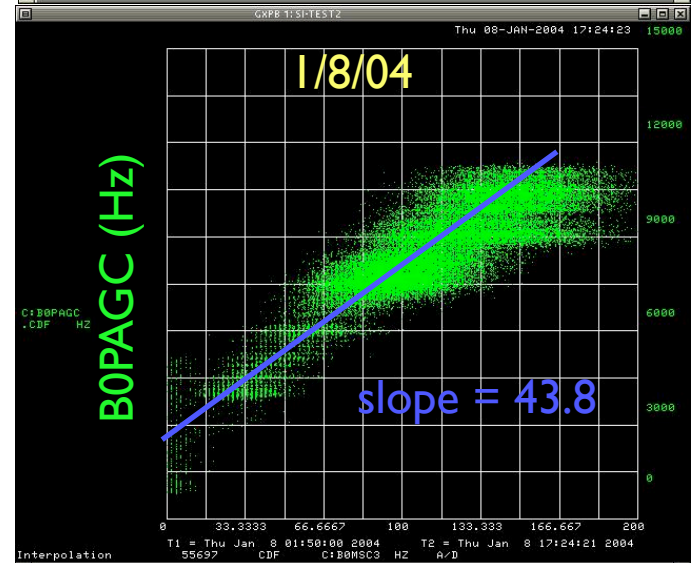
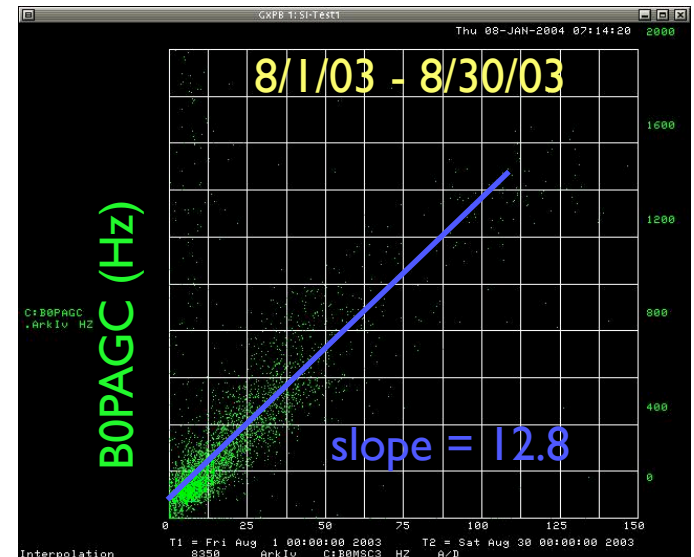
B0MSC3

1/7/04: B0MSC3 back online (M.Binkley)

Use naive scaling to connect new/old B0PAGC rates.

$$Rate_{(Jan04)} = Scale \cdot Rate_{(Aug03)}$$

$$Scale = \frac{slope_{(Jan04)}}{slope_{(Aug03)}} = \frac{43.8}{12.8} = 3.3$$



B0MSC3 (Hz)

# References

## Beam and Halo Monitoring:

M. Karagoz-Unel, R.J. Tesarek, NIM [A506](#) (2003) 7-19.

M. Gallinaro, FERMILAB-CONF-02-121-E(2002) 11.

[http://www-cdfonline.fnal.gov/acnet/ACNET\\_beamquality.html](http://www-cdfonline.fnal.gov/acnet/ACNET_beamquality.html)

## Beam Induced Backgrounds and Radiation:

[http://ncdf67.fnal.gov/~tesarek/halo/joint\\_physics/020503](http://ncdf67.fnal.gov/~tesarek/halo/joint_physics/020503)

CDF note: 5873

CDF note: 5926

CDF note: 5960

CDF note: 6753

CDF note: 6761